AMENDMENTS TO THE CLAIMS

1-99. (Canceled)

100. (New) A method for analyzing data from a glucose sensor, comprising:

monitoring a data stream from the sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise; and

replacing at least some of the signal artifacts using estimated glucose signal values.

101. (New) The method of claim 100, wherein the data stream monitoring step comprises receiving data from one of a non-invasive, a minimally invasive, and an invasive glucose sensor.

102. (New) The method of claim 100, wherein data signal obtaining step comprises receiving data from one of an enzymatic, a chemical, a physical, an electrochemical, a spectrophotometric, a polarimetric, a calorimetric, an iontophoretic, and a radiometric glucose sensor.

103. (New) The method of claim 100, wherein the signal artifacts detection step comprises at least one of: testing for ischemia within or proximal to the glucose sensor; monitoring a level of pH proximal to the sensor; monitoring a temperature proximal to the sensor; comparing a level of pH proximal to and distal to the sensor; comparing a temperature proximal to and distal to the sensor; monitoring a pressure or stress within the glucose sensor; evaluating historical data for high amplitude noise above a predetermined threshold; a Cone of Possibility Detection Method; evaluating the data stream for a non-physiological rate-of-change; monitoring the frequency content of the signal; performing an orthogonal basis function-based transform; performing a Fourier Transform; and performing a wavelet transform.

104. (New) The method of claim 100, wherein the artifacts replacement step comprises at least one of: performing linear or non-linear regression; performing a trimmed mean; filtering using a non-recursive filter; filtering using a finite impulse response filter; filtering using a recursive filter; filtering using an infinite impulse response filter; performing a maximum average algorithm; and performing a Cone of Possibility Replacement Method.

105. (New) The method of claim 100, wherein the signal artifacts replacement step is substantially continual.

106. (New) The method of claim 100, wherein the signal artifacts replacement step is initiated in response to positive detection of signal artifacts.

107. (New) The method of claim 100, wherein the signal artifacts replacement step is terminated in response to detection of negligible signal artifacts.

108. (New) The method of claim 100, further comprising discarding at least some of the signal artifacts.

109. (New) The method of claim 100, further comprising projecting glucose signal values for a time during which no data is available.

110. (New) A method for analyzing data from a glucose sensor, comprising:

monitoring a data stream from the sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise; and

replacing at least some of the signal artifacts using estimated glucose signal values, wherein the signal artifacts detection step comprises testing for ischemia within or proximal to the glucose sensor.

111. (New) The method of claim 110, wherein the ischemia testing step comprises obtaining oxygen concentration using an oxygen sensor proximal to or within the glucose sensor.

112. (New) The method of claim 110, wherein the ischemia testing step comprises comparing a measurement from an oxygen sensor proximal to or within the glucose sensor with a measurement from an oxygen sensor distal from the glucose sensor.

113. (New) The method of claim 110, wherein the glucose sensor comprises an electrochemical cell comprising a working electrode and a reference electrode, and wherein the ischemia-testing step comprises pulsed amperometric detection.

114. (New) The method of claim 110, wherein the glucose sensor comprises an electrochemical cell comprising working, counter and reference electrodes, and wherein the ischemia-testing step comprises monitoring the counter electrode.

115. (New) The method of claim 110, wherein the glucose sensor comprises an electrochemical cell comprising working and reference electrodes, and wherein the ischemia-testing step comprises monitoring the reference electrode.

116. (New) The method of claim 110, wherein the glucose sensor comprises an electrochemical cell comprising an anode and a cathode, and wherein the ischemia-testing step comprises monitoring the cathode.

117. (New) A method for analyzing data from a glucose sensor, comprising:

monitoring a data stream from the sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise by measuring at least one of rate-of-change, acceleration, and physiologically feasibility of one or more signal values; and

selectively applying at least one algorithm conditional on a range of one of the measurements.

118. (New) A method for analyzing data from a glucose sensor, comprising:

monitoring a data stream from the sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise, including evaluating a severity of the signal artifacts; and

replacing at least some of the signal artifacts using estimated glucose signal values.

119. (New) The method of claim 118, wherein the severity evaluation is based on an amplitude of the transient non-glucose related signal artifacts.

120. (New) The method of claim 118, wherein the severity evaluation is based on a duration of the transient non-glucose related signal artifacts.

121. (New) The method of claim 118, wherein the severity evaluation is based on a rate-of-change of the transient non-glucose related signal artifacts.

122. (New) The method of claim 118, wherein the severity evaluation is based on a frequency content of the transient non-glucose related signal artifacts.

123. (New) The method of claim 118, wherein the artifacts replacement step comprises selectively applying one of a plurality of signal estimation algorithm factors in response to the severity of the signal artifacts.

124. (New) The method of claim 123, wherein the plurality of signal estimation algorithm factors comprise a single algorithm with a plurality of parameters that are selectively applied to the algorithm.

125. (New) The method of claim 123, wherein the plurality of signal estimation algorithm factors comprise a plurality of distinct algorithms.

126. (New) The method of claim 123, wherein the step of selectively applying one of a plurality of signal estimation algorithm factors comprises selectively applying a predetermined algorithm that comprises a set of parameters whose values depend on the severity of the signal artifacts.

127. (New) A method for processing data signals obtained from a glucose sensor, the method comprising:

obtaining a data stream from a glucose sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise; and

selectively applying one of a plurality of signal estimation algorithm factors to replace non-glucose related signal artifacts.

128. (New) The method of claim 127, wherein the data signal obtaining step comprises receiving data from one of a non-invasive, a minimally invasive, and an invasive glucose sensor.

129. (New) The method of claim 127, wherein data signal obtaining step comprises receiving data from one of an enzymatic, chemical, physical, electrochemical, spectrophotometric, polarimetric, calorimetric, iontophoretic, and radiometric glucose sensor.

130. (New) The method of claim 127, wherein the signal artifacts detection step comprises at least one of monitoring a level of pH proximal to the sensor; monitoring a temperature proximal to the sensor; comparing a level of pH proximal to and distal to the sensor; comparing a temperature proximal to and distal to the sensor; monitoring the pressure or stress within the glucose sensor; evaluating historical data for high amplitude noise above a predetermined threshold; a Cone of Possibility Detection Method; evaluating the signal for a

non-physiological rate-of-change; monitoring the frequency content of the signal; performing an orthogonal basis function-based transform; performing a Fourier Transform; performing a wavelet transform;

131. (New) The method of claim 127, wherein the selective application step comprises at least one of performing linear or non-linear regression; a trimmed mean; filtering using a non-recursive filter; filtering using a finite impulse response filter; filtering using a recursive filter; filtering using an infinite impulse response filter; performing a maximum average algorithm; and performing a Cone of Possibility algorithm.

132. (New) The method of claim 127, wherein the selective application step is substantially continual.

133. (New) The method of claim 127, wherein the selective application step is initiated in response to positive detection of signal artifacts.

134. (New) The method of claim 127, wherein the selective application step is terminated in response to detection of negligible signal artifacts.

135. (New) The method of claim 127, wherein the plurality of signal estimation algorithm factors comprise a single algorithm with a plurality of parameters that are selectively applied to the algorithm.

136. (New) The method of claim 127, wherein the plurality of signal estimation algorithm factors comprise a plurality of distinct algorithms.

137. (New) The method of claim 127, wherein the selective application step comprises selectively applying a predetermined algorithm that comprises a set of parameters whose values depend on the severity of the signal artifacts.

138. (New) The method of claim 127, wherein the signal artifacts detection step comprises testing for ischemia within or proximal to the glucose sensor.

139. (New) A method for processing data signals obtained from a glucose sensor, the method comprising:

obtaining a data stream from a glucose sensor;

detecting transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise; and

estimating future glucose signal values based on historical glucose values.

140. (New) The method of claim 139, wherein glucose future estimation step comprises algorithmically estimating the future signal value using at least one of linear regression, non-linear regression, and an auto-regressive algorithm.

141. (New) A system for processing data signals obtained from a glucose sensor, the system comprising:

a signal processing module comprising programming to monitor a data stream from the sensor over a period of time;

a detection module comprising programming to detect transient non-glucose related signal artifacts in the data stream that have a higher amplitude than a system noise; and

a signal estimation module comprising programming to replace at least some of the signal artifacts with estimated glucose signal values.

142. (New) A continuous glucose monitoring device, comprising:

a glucose sensor; and

a processor operatively linked to the sensor designed to receive a data stream from the sensor;

wherein the processor is programmed to analyze the data stream and to detect transient non-glucose related signal artifacts in the data stream that have a higher amplitude than system noise, and to replace at least some of the signal artifacts with estimated values.

143. (New) A method of analyzing data from a glucose sensor, the method comprising:

receiving data from a glucose sensor, the data comprising at least one sensor data point;

determining whether a signal artifact event has occurred; and

outputting data representative of one or more estimated glucose values, including at least one of a numeric estimated glucose value, an indication of directional trend of glucose concentration, and a graphical representation, wherein the one or more estimated glucose values are filtered and calibrated when a signal artifact event is determined to have occurred.

144. (New) The method of claim 143, wherein the one or more estimated glucose values are unfiltered and calibrated data when a signal artifact is determined not to have occurred.

145. (New) A system configured to process data from an analyte sensor, the system comprising:

a data receiving module configured to receive sensor data from the analyte sensor, the data comprising at least one sensor data point;

a signal artifacts module configured to detect a signal artifact in the sensor data; and

an output module configured to output filtered, calibrated data when a signal artifact event is determined to have occurred.

146. (New) The system of claim 145, wherein the output module is configured to output unfiltered, calibrated data when a signal artifact is determined not to have occurred.

147. (New) The system of claim 146, wherein the data output represented by at least one of a numeric estimated glucose value, an indication of directional trend of glucose concentration, and a graphical representation.